SECTION 13

FIRE DETECTION AND EXTINGUISHING SYSTEMS

13.1 REFERENCES

(13A) Code of Federal Regulations – 46 CFR Sub-chapter I

(13B) NATIONAL FIRE PROTECTION ASSOCIATION - NFPA 17A, *Standard on Wet Chemical Extinguishing System*

(13C) NATIONAL FIRE PROTECTION ASSOCIATION - NFPA 72, *National Fire Alarm Code*

(13D) NATIONAL FIRE PROTECTION ASSOCIATION - NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems ~ (2004 edition)*

(13E) NATIONAL FIRE PROTECTION ASSOCIATION – NFPA 750 - *Water Mist Fire Extinguishing Systems*

13.2 INTRODUCTION

This Section describes the Contractor Design and Provide general requirements for the U.S. Coast Guard mandated enhanced fire suppression system, smoke/fire detection and alarm systems, fire extinguishing systems, and emergency equipment.

For WSF Fleet-wide Standardization purposes, End No. 1 of the Vessel shall always be considered the bow, and this designation shall delineate port and starboard, fore and aft wherever they are addressed in the Technical Specification.

13.3 GENERAL

The Vessel shall be delivered fully outfitted with all fire and smoke detection systems, fire extinguishing systems, and emergency equipment required by Authoritative Agencies.

The detection and extinguishing systems shall be comprised of components that are suitable for use in a marine environment; that is, resistant to salt air and moisture-laden atmospheres, and not affected by shipboard vibration, motions, ambient temperatures, Electro-Magnetic Interference (EMI), Radio Frequency (RF), and power source variations. All systems shall meet the applicable requirements of References (13A) through (13E).

All fire extinguishing installations in quarters and public spaces shall harmonize with the surrounding decorative treatment of the spaces, retaining necessary access for use and maintenance. All controls, fire hose, nozzles, semi-portable extinguishers, portable

extinguishers, fire axes, self-contained breathing apparatus, etc., shall be readily accessible under all conditions.

To allow for the maximum certification time, all fire fighting equipment certifications shall begin their current certification time period to correspond with Sea Trials discussed in Section 101 of the Technical Specification.

Signs and labels shall be provided in accordance with Authoritative Agency requirements and Section 24 of the Technical Specification.

The Firemain system is specified in Section 58 of the Technical Specification.

A manual type Firemain Sprinkler System for the Vehicle Deck areas is specified in Section 58 of the Technical Specification.

All piping, piping appurtenances, and associated equipment of all fire extinguishing systems shall be thoroughly cleaned after fabrication. After installation **and** pressure testing each system shall be thoroughly cleaned or flushed in accordance with the manufacturer's and Authoritative Agencies requirements.

See the *TRAINING OF WSF PERSONNEL* Subsection in Section 1 of the Technical Specification for additional training requirements.

13.4 USCG MANDATED ENHANCED FIRE SUPPRESSION SYSTEMS

The requirements of this Subsection, as set forth in the *INTRODUCTION* Subsection in this Section of the Technical Specification, has been eliminated except as follows:

1. Internally illuminated "EXIT" signs shall be provided to provide a positive means of identifying evacuation routes in reduced visibility conditions. See Section 92 of the Technical Specification.

13.5 SMOKE AND FIRE DETECTION SYSTEMS

Smoke and fire detection systems, and manually operated call points, shall be provided in accordance with manufacturer's and Authoritative Agency requirements, and ASTM F1198.

13.5.1 Rate-of-Rise Systems

Systems in the Paint Locker, and Emergency Diesel Generator Room shall provide for "rate-of-rise" temperature detectors to active those systems, in addition to local and manual activation, as installed in this Section of the Technical Specification.

13.5.2 Battery Operated Smoke Detectors

Provide battery operated smoke detectors in each crew stateroom, every twenty (20) LF in the passages serving those staterooms, all dayrooms, Sun Deck Ship's Office, and two (2) each in the Engineer's Stores & Engineering Crew Locker Room/Stores.

Provide smoke detectors in each elevator as required by Authoritative Agencies unless waivered.

NOTE: In the past WSF has received waivers from L&I for elevator smoke detectors due to the low quantity of station levels for these Vessel units. It is WSF's desire to have these smoke detectors waivered by L&I.

Detection system components located in crew staterooms and passages shall be integrated into the surrounding decor to provide a pleasing and neat appearance.

Additional requirements for fire detection and extinguishing systems are stated in Section 95 of the Technical Specification.

13.6 FIRE EXTINGUISHING SYSTEMS

13.6.1 General

Fixed fire extinguishing systems shall be designed and provided for the Engine Rooms, Emergency Diesel Generator Room, Upper Vehicle Deck Paint Locker, and other compartments as required by 46 CFR §76 and all other Authoritative Agencies.

For Firemain and Sprinkler fire suppression systems see Section 58 of the Technical Specification.

See technical manual requirements of Section 100 of the Technical Specification.

13.6.1.1 CO_2 Systems

All CO_2 fire extinguishing systems supplied shall be manufactured by WALTER KIDDE Inc. (KIDDE-FENWALL Inc.), or equal. CO_2 cylinder stowage racks shall withstand service environment conditions as set forth in Section 1 of the Technical Specification during storage and operation, and permit two (2) bottles to be released and weighed, at a time, without disturbing other cylinders. The systems shall be provided with weigh railings, scale, brackets, slings, etc. necessary to weigh each cylinder. Mounting brackets to store the cylinder caps, scale, slings, and other associated loose equipment shall be provided in the vicinity of the cylinders.

Semi-portable systems CO_2 cylinder stowage shall also allow for GINGE-KERR Liquid Level Indicator testing equipment to measure CO_2 liquid levels in cylinders without the need to remove a cylinder from its rack.

Pressure testing of the CO_2 piping systems shall be in accordance with 46 CFR §76 and Section 101 of the Technical Specification**.**

13.6.1.2 HI-FOG High Pressure Water Mist Fire Suppression Systems, General

OVERVIEW: The intent is for the Contractor to provide a high pressure water mist fire suppression system that can be activated for total flooding of Engine Room No. 1, Engine Room No. 2, Emergency Diesel Generator Room, and the UVD Paint Locker from a single pump unit source. In addition, the same suppression system shall be capable of providing rapid response local application over potential fire hazards in Engine Room No. 1 and Engine Room No. 2 by means of subdivisions of each Engine Room into three (3) independently controlled sections. Local Application is defined as a "***water mist section"*** that can be activated by readily accessible release switches in each Engine Room as an "on-the-scene" fire-fighting resource option to hand-held portable extinguishers or semi-portable CO_2 hose reels. The water mist system shall include all equipment, foundations, materials, controls, power, alarms, signage, and support system connections to provide a complete and operable USCG approved Hi-Fog total flood/local application high pressure water mist fire suppression system.

Engine Rooms No.1 and No. 2, the Upper Vehicle Deck Paint Locker, and the Emergency Diesel Generator Room on the Sun Deck shall be protected by a

USCG approved MARIOFF Hi-Fog® MT4 high pressure, or equal, total flooding marine engineered water mist fire suppression system.

It is intended that the MARIOFF Hi-Fog® MT4 high pressure system, or equal, supplier or factory certified installer design, provide, and install (in concert with the Shipyard) all components for a complete USCG approved water mist fire detection, alarm, and suppression system. The Shipyard shall support the installation and provide the freshwater and seawater supply piping, Hi-Fog Water Mist System/Back-flush Fresh Water Storage Tank, Ship's Service compressed air supply piping, hangers and brackets that support tubing hangers, junction boxes, and cabling external to enclosures.

The system designer shall be familiar with this type of fire fighting system so that the design will meet the requirements of the United States Coast Guard (USCG), International Marine Organization (IMO) MSC/Circ 1165 (as adopted by IMO in May 2005).

For the Hi-Fog Water Mist Fire Suppression System/Back-flush Fresh Water Storage Tank see Section 78 of the Technical Specification.

TABLE 13-1

HI-FOG High Pressure Water Mist System Machinery Space Valve Release Station Type/Location

RELEASE SWITCH DESCRIPTION	EOS Release Panel	Engine Room No. 1, Port	Engine Room No. 1, Stbd	Engine Room No. 2, Port	Engine Room No. 2, Stbd	Top of Port Egress Stairway from EOS Deck Level	Top of Stbd Egress Stairway from EOS Deck Level	Emergency Diesel Gen. Room	Outside Emergency Diesel Generator Room	UVD Paint Locker	Outside UVD Paint Locker
Momentary Push Button Switch for ER No. 1 Total Flooding	✓					✓	✓				
Momentary Push Button Switch for ER No. 2 Total Flooding	✓					✓	✓				
Momentary PB Switch for ER No. 1, Main Engine No. 1 Local Protection	✓	✓	✓								
Momentary PB Switch for ER No. 1, SSDG No. 1 & No. 2 Local Protection	✓	✓	✓								
PB Switch for ER No. 1, ER Bilge Local Protection	✓	✓	✓								

TABLE 13-1, cont'd

HI-FOG High Pressure Water Mist System Machinery Space Valve Release Station Type/Location

RELEASE SWITCH DESCRIPTION	EOS Release Panel	Engine Room No. 1, Port	Engine Room No. 1, Stbd	Engine Room No. 2, Port	Engine Room No. 2, Stbd	Top of Port Egress Stairway from EOS Deck Level	Top of Stbd Egress Stairway from EOS Deck Level	Emer. Diesel Gen. Room	Outside Emer. Diesel Gen. Room	UVD Paint Locker	Outside UVD Paint Locker
Momentary PB Switch for ER No. 2, Main Engine No. 2 Local Protection	✓			✓	✓						
Momentary PB Switch for ER No. 2, SSDG No. 3 & F.O. Purifier Local Protection	✓			✓	✓						
Momentary PB Switch for ER No. 2, Oil-fired Hot Water Heater Local Protection	✓			✓	✓						
Heat Detector/Actuator Form C Contact Switch for Emer. Diesel Gen. Room Total Flooding								✓			

TABLE 13-1, cont'd

HI-FOG High Pressure Water Mist System Machinery Space Valve Release Station Type/Location

RELEASE SWITCH DESCRIPTION	EOS Release Panel	Engine Room No. 1, Port	Engine Room No. 1, Stbd	Engine Room No. 2, Port	Engine Room No. 2, Stbd	Top of Port Egress Stairway from EOS Deck Level	Top of Stbd Egress Stairway from EOS Deck Level	Emer. Diesel Gen. Room	Outside Emer. Diesel Gen. Room	UVD Paint Locker	Outside UVD Paint Locker
Momentary PB Switch for Emer. Diesel Gen. Room Total Flooding	✓								✓		
Heat Detector/Actuator Form C Contact Switch for UVD Paint Locker Total Flooding										✓	
Momentary PB Switch for UVD Paint Locker Total Flooding	✓										✓

Engine Rooms No. 1 and No. 2 shall be served manually by a single remote Hi-Fog® Sprinkler Pump Unit (SPU), namely a SPU 5+1 (six (6) electric pump motors, one (1) of which is for redundancy purposes, with two (2) high pressure pumps connected to each motor) pump unit (meeting IMO SOLAS requirements) for total flooding, or local actuation with appropriate control systems to select the appropriate compartment/area section in the event of a fire. The Emergency Generator Room and Upper Vehicle Deck Paint Locker shall also be served by a supply from the same abovementioned pump unit. The Emergency Generator Room and UVD Paint Locker shall be provided thermal detector actuators

(powered from the Hi-Fog® release panel), in addition remote break glass momentary push buttons.

Hi-Fog High Pressure Water Mist System Manufacturer's Scope of Supply:

- Provide all equipment required to produce an approved, complete and operable high pressure water mist fire suppression system as defined in this Technical Specification.

- The approved system manufacturer's field technical representative, or his alternate, shall be available 24/7 to respond to a system service request within twenty-four (24) hours.

- Shipyard installation guidance, commissioning, start-up, USCG acceptance demonstration, and testing of the high pressure water mist fire suppression system shall be provided by the manufacturer's certified field service representative.

- Provide USCG approved design drawings, specifications, and material list of the complete system.

- Provide a one-line diagram of the piping arrangement, showing principal routing of tubing, arrangement of section valves, valve header, and location of spray heads.

- Provide layout drawing of SPU, showing main dimensions, location of pipe connections, and foundation requirements for attachment to ship structure.

  NOTE: It is intended that the SPU be located in the starboard Crew Locker Room/Stores area outboard of the EOS/Engineers' Restroom area.

- Provide cabling specifications, including size, type, and number of conductors.

- Provide a one-line connection diagram and a point-to-point connection diagram.

- Provide an internal circuit diagram of all electric cabinets and panels delivered by the manufacturer.

- Provide panel layouts for all Hi-Fog manufacturer supplied enclosures.

- Provide system documentation, containing the above drawings and diagrams, system description, installation manual, operations manual, and

service parts manual. Provide three (3) hard copies and three (3) CD-ROM copies of all documentation per Vessel.

- Prepare and submit to the USCG all documentation needed for approval of the complete system. The system shall be delivered with all final approvals.

- Hi-Fog Sprinkler Pump Unit, SPU 5+1, Product E01230.3, as set forth in MARIOFF Hi-Fog® Technical Data Sheet TE5001, or equal, equipped with 480 Vac, 60 Hz, 3-phase high pressure pump motors and all standard features such as, but not limited to:

    1. Pneumatic standby pump with ship service air connection piping,
    2. Break water tank,
    3. Equalization valve,
    4. Required flow, level, and pressure switches,
    5. Meter for indication of wet pipe pressure,
    6. 100µm fresh feed water supply filter,
    7. 72µm separator for alternate seawater supply, and
    8. Test valve and related devices to conduct periodic safety and maintenance testing of MT4 system.

- Hi-Fog High Pressure Water Mist System Pump Unit SPU 5+1 Starter Cabinet for Product E01230.3, as set forth in MARIOFF Hi-Fog® Technical Data Sheet TE5001, or equal, equipped with the following options: 480 Vac, 60 Hz, 3-phase motor starters, fresh water feed pump motor starter, alarm outputs to the ship's alarm and monitoring system consisting of ***1).*** Hi-Fog system activated, ***2).*** pump unit fault, ***3).*** out of water in break water tank, **4).** Section valve(s) open indication (**NOTE:** *it is required for each section valve to indicate, by individual illuminated identifiers, which of the section valves are open*). The Starter Cabinet shall also contain all standard features such as, but not limited to:

    1. Relays to control operation of the high-pressure pumps, feed water pump, FR Circuit outputs, and alarm outputs in response to sensor and command inputs,
    2. A 230 Vac control power supply,

3. A 24 Vdc power supply,
4. A sealed battery back-up with charger,
5. An ABT switch for transfer between normal and alternate 480 Vac power,
6. An individual front-panel mounted manual start switch, indicator lamp, and Ampere meter for each high-pressure pump and feed water pump,
7. A front panel-mounted main power switch,
8. A front panel-mounted indicator lamp push-to-test button, and
9. The Starter Cabinet enclosure class is IP54.

- Section valves, 24 Vdc solenoid operated, with manual over ride operation via a T-handle pull lever, MARIOFF Hi-Fog® NS 20 or NS 40, or equal, as required to match required flow rate, equipped with piston position indicator with LED.

- Tubing header pipe assembly of AISI 316L stainless steel, flanged to SPU high-pressure water outlet valve, fitted with properly sized flanges, evenly spaced, to mount the section valves, valve spacing to be such that valves can be readily serviced and position status LED's on valves can be easily seen while standing in front of the Starter Cabinet.

- Spray heads, MARIOFF Hi-Fog®, or equal, stainless steel, together with separate stainless steel sockets for connection to the tubing, USCG approved for use with machinery space water mist total flooding system of spaces up to 3,300 cubic meters (approx. 116,538 cubic feet) in volume.

- Tubing, welded type, AISI 316L stainless steel, using DIN standards, sufficient amount for the installation of the system in accordance with USCG approved design.

- Fittings, PARKER HANNIFIN CORP., or equal, cutting ring compression tube fittings of DIN 2353 standard, S-class, design pressure of 5,800 psi (400 bar).

- Tubing hangers and clamps as set forth in Section 74 of the Technical Specification.

- Release Panel, consisting of an EOS bulkhead-mounted Class IP 54 enclosure, and a remote-mounted operating panel located on the EOS

Control Console. The operating panel shall consist of a phenolic board engraved with an inboard profile and hold deck plan view mimic of the Vessel, with a surface area large enough to group the Section Valve momentary pushbuttons for intuitive operation by the Vessel Engineer. Provide indicator lamps on the operating panel to display status of the following: ***1).*** SPU Activated, Section Valve(s) "OPEN" indicator lamps, one (1) for each valve (may be incorporated into the Section Valve momentary pushbutton), ***2).*** Ship's Service Switchboard Power Available indicator lamp, ***3).*** Control System "ON" indicator lamp, ***4).*** 24 Vdc Power Supply Failure indicator lamp, ***5).*** 24 Vdc Ground Fault indicator lamp, ***6).*** Pump Unit Fault indicator lamp, ***7).*** Feed Water Pump "ON" indicator lamp, ***8).*** "Out of Water" indicator lamp, ***9).*** Meter for indication of wet pipe pressure, ***10).*** An indicator lamp "push-to-test" button. Final Design of this operating panel shall be approved by the WSF Representative prior to fabrication. See **TABLE 13-1,** *Hi-Fog Machinery Space Valve Release Station Type/Location.*

- Feed Water Pump and Motor Assembly.

- USCG approved momentary push button switches, mounted in MARIOFF-supplied RITTAL Corp., or equal, readily operable watertight enclosures with lever-handle hinged covers, for section valve release for total flooding of Engine Room No. 1, Engine Room No. 2, Emergency Diesel Generator Room, and UVD Paint Locker. Locate switches as follows: at the top of the stairways leading to the Vehicle Deck for the Engine Rooms (E.R. specific switch), EOS/Workshop (E.R. #1 and E.R. #2 switch) and Engineer's Stores areas (E.R. #1 and E.R. #2 switch), and just outside the door to the Emergency Generator Room and UVD Paint USCG approved momentary push button switches, mounted in MARIOFF-supplied RITTAL Corp., or equal, readily operable watertight enclosures with lever-handle hinged covers, for section valve release Locker. See **TABLE 13-1,** *Hi-Fog High Pressure Water Mist System Machinery Space Valve Release Station Type/Location*.

- Rate-of-rise temperature detectors, two (2) each, for automatic water mist release in the Emergency Diesel Generator Room and UVD Paint Locker. Detectors shall be KIDDE-FENWAL Model 27121, 24Vdc, DETECT-A-FIRE units, or equal. See **TABLE 13-1,** *Hi-Fog High Pressure Water Mist System Machinery Space Valve Release Station Type/Location*.

- Local actuation section valve release switches, two (2) stations each consisting of three (3) switches per station shall be provided in each Engine Room for individual release of each local application section. The switches shall be grouped together in MARIOFF-supplied RITTAL Corp. readily operable watertight enclosures with lever-handle covers. Final

location of the release button stations shall be approved by the WSF Representative upon completion of the spaces' detailed Shipyard design. See **TABLE 13-1,** *Hi-Fog High Pressure Water Mist System Machinery Space Valve Release Station Type/Location*.

- Provide alarm outputs from the Release Panel to ship's alarm light bar and audible alarm located in each Engine Room, alarm output shall energize whenever any of the space valves protecting that Engine Room opens.

- Provide USCG approved audible and visual alarms inside the Emergency Diesel Generator Room and just outside the UVD Paint Locker. Provide alarm outputs from the Release Panel to energize these alarms whenever the space valves protecting these spaces open.

- Provide FR (fire retard) circuit activation outputs from the Release Panel to the ship's FR Circuit such that when any of the section valves open, the FR Circuit activates for the associated protected space to secure ventilation and/or close fire dampers.

- Provide an external cable schedule complete with recommendations for labeling system for individual cable identification and conductor floater designations.

- Provide an engraved phenolic board, one (1) each, along with a suitable backing plate and means of mounting near the SPU Control Cabinet, approximately 30" wide × 24" high, "RED" with at least ¼" high "WHITE" block lettering, showing one-line diagram of the main system components and tubing runs, with directions for normal and off-normal activation. Final design of this phenolic board shall be approved by the WSF Representative.

- All Work shall be accomplished in accordance with the requirements of the Technical Specification.

Shipyard Scope of Supply:

- Provide and install a complete MARIOFF MT4, or equal, system under the direct on-site guidance of the Hi-Fog high pressure water mist system manufacturer's field technical support according to the USCG approved installation drawings, including termination of external cabling.

- Provide and install all electrical cabling and junction boxes, external to enclosures or SPU, including cabling terminations, cabling size and type to be as specified by the system manufacturer.

- Provide and install the outlet boxes for mounting the "rate-of-rise" thermal detectors in the overheads of the Emergency Diesel Generator Room and UVD Paint Locker.

- Provide recessed pockets in the weather-side bulkheads adjacent to the entry doors to the Emergency Diesel Generator Room and UVD Paint Locker of sufficient size to mount the release switch enclosures. Provide a framed, weather-tight, rubber-gasketed, bolt-on, scored, clear acrylic cover over the recesses to serve as tamper-resistant protection tamper-resistant protection.

- Provide and install metal brackets to support clamps, hangers, and spray heads as required.

- Provide and install an SPU foundation, junction box foundations, and all foundations for manufacturer-supplied enclosures.

- Provide and install collars and packing glands for penetration of piping, tubing, and cabling through subdivision bulkheads or fire boundaries.

- Provide at least 28 inches of maintenance clearance all around SPU/Starter Cabinet assembly.

- Provide and install a drain line from high-pressure pump units routed to the bilge.

- Provide and install a ½ inch NPT, 90 PSI Ship's Service air supply line, complete with pressure gage and pressure gage isolation ball valve for maintaining the standby pressure in the wet pipe system.

- Provide 2-inch isolation ball valve and piping from the Firemain to the seawater connection on SPU. The isolation valve to be provided in same compartment where SPU is located.

- Install a Hi-Fog Water Mist System manufacturer provided fresh water feed pump assembly near. the base of the Hi-Fog Water Mist System/Back-flush Fresh Water Storage Tank, (the motor starter for the feed pump shall be supplied by the Hi-Fog system manufacturer in the SPU Starter Cabinet).

- Install 2-inch piping, with a 2-inch ball valve from the Hi-Fog Water Mist System/Back-flush Fresh Water Storage Tank to the feed pump inlet, install 2-inch piping and 2-inch ball valve from the feed pump outlet to the SPU fresh water supply inlet.

- Provide two (2) Shipyard personnel to assist, as needed, the manufacturer's representative(s) in start-up and commissioning.

- The request for the system manufacturer's field technical assistance at the Shipyard for installation guidance and for commissioning shall be made no later than three (3) weeks prior to when the field technical assistance is needed in the Shipyard.

- Up-to-date general arrangement and machinery arrangement drawings are to be supplied to the Hi-Fog system manufacture as AutoCAD drawing files format to be used for the one-line piping diagram.

- All Work shall be accomplished in accordance with the requirements of the Technical Specification.

Pressure testing of the water mist fire suppression system piping systems shall be in accordance with Section 101 of the Technical Specification and the manufacturer's U.S. Coast Guard type approved system installation manual**.**

Provide spare parts, and operating and maintenance instructions for each system as recommended by the manufacturer and approved by the WSF Representative.

See the *TRAINING OF WSF PERSONNEL* Subsection in Section 1 of the Technical Specification.

13.6.1.3 Vehicle Deck Manual Sprinkler System

Requirements for a Vehicle Deck manual type Firemain Sprinkler System and the Firemain system are set forth in Section 58 of the Technical Specification.

13.6.1.4 Firefighting Foam System

Provide portable Firefighting Foam System components for use in conjunction with the Firemain Fire Fighting System throughout the Vessel.

For WSF Fleet-wide Standardization purpose, provide sixteen (16) 5-gallon buckets DENKO BRAND 3% AFFF Firefighting Foam. The four (4) 5-gallon buckets not provided with storage racks, as provided in Section 18 of the Technical Specification, shall be stored loose in the Firefighting Foam Storage Locker on End No.1 for distribution by WSF personnel.

For WSF Fleet-wide Standardization purpose, provide four (4) AKRON Model 3951, 3% ratio, 95 GPM at line pressure of 100 PSI, portable foam inductor nozzle assemblies consisting of a nozzle, pick-up tube, and shut off valve. The portable foam inductor nozzle assemblies assembly attaches to standard fire hose. Mount two (2) of the portable foam inductor nozzle assemblies, one (1) each, in the Firefighting Foam Storage Locker as set forth in

Section 18 of the Technical Specification. The remaining two (2) portable foam inductor nozzle assemblies shall be turned over to the WSF Representative for distribution.

13.6.2 Engine Rooms

13.6.2.1 Engine Room HI-FOG® High Pressure Water Mist Fixed Systems

Provide a MARIOFF Hi-Fog® MT4, or equal, water mist combination total flooding and local protection fire suppression system as outlined in the *Hi-Fog High Pressure Water Mist Fire Protection Systems – General* Subsection in this Section of the Technical Specification.

System training shall be provided by the manufacturer to cover both set up, operation, and maintenance of the system. For bidding purposes, the Contractor's shall provide two (2) training sessions. One (1) session of ten (10) WSF personnel for each Vessel. Each training session shall take place over a two (2) consecutive eight (8) hour day periods and shall consist of four (4) hours of operational training followed by twelve (12) hours of maintenance training. Design and provide a WSF Representative-approved computer-based training (CBT) DVD covering operation and maintenance. The intent of the DVD is as a refresher course for those who have completed the two-day training session, and also as a stand-alone course for future WSF personnel who will not have taken the two-day training session.

13.6.2.2 Engine Room Semi-Portable CO_2 Systems

Design and provide a semi-portable 150-pound CO_2 fire extinguishing system in each Engine Room in accordance with 46 CFR §76. Support the hose reel and two (2) 75-pound cylinders securely from the Vessel's structure. Each semi-portable system shall be equipment as listed in **TABLE 13-2** below:

TABLE 13-2

Hose Reel Equipment

Quantity	Product Code (or current PN)	Description
2	CO2-8702087	75 pound cylinder valve assembly, straight siphon
2	CO2-872442	discharge head, grooved nut
2	CO2-251821	flexible hose, ¾" outlet
1	CO2-207877	wye fitting, ¾"
2	CO2-241219	cylinder strap, 75 pound
2	CO2-870652	lever operated control head
1	CO2-994058	reel
1	CO2-918435	hose, ¾" × 50 feet
1	CO2-8349	hose-to-hose Thd Pro (ferrule)
1	CO2-980564	horn/valve assembly
1	CO2-909	coupling nut, hose reel
1	CO2-960099	clip, handle
1	CO2-939	clip, horn
1	CO2-282386	instruction plate, Model HR-1
1	CO2-40571	instruction manual

13.6.3 Emergency Diesel Generator Room

Provide a MARIOFF Hi-Fog® MT4, or equal, water mist combination total flooding and local protection fire suppression system as outlined in the *Hi-Fog High Pressure Water Mist Fire Suppression Systems – General* Subsection in this Section of the Technical Specification.

13.6.4 Upper Vehicle Deck Paint Locker

Provide a MARIOFF Hi-Fog® MT4, or equal, water mist combination total flooding and local protection fire suppression system as outlined in the *High-Fog High Pressure Water Mist Fire Suppression Systems – General* Subsection in this Section of the Technical Specification.

13.7 EMERGENCY EQUIPMENT

13.7.1 Portable Fire Extinguishers

Portable fire extinguishers shall be distributed throughout the Vessel in accordance with 46 CFR §76. A suitable USCG approved marine bracket or support shall be installed for each extinguisher. Fire extinguishers in way of Passenger Deck areas shall be recessed and fitted with a metal framed glass door to suit interior decor. Fire extinguishers on the Lower and Upper Vehicle Deck, Sun Deck, and all weather deck areas shall be enclosed in surface mounted, "RED" fiberglass, with USCG approved motion bracket, cabinets with clear plastic door, suitably framed and a key lock, CHEYENNE Manufacturing, or equal. The clear plastic door shall be v-grooved (scored) and provided with a "RED" pull "tee" handle, as on other WSF Ferry Vessels, to break for emergency access. All stowage shall meet service environment conditions as set forth in Section 1 of the Technical Specification. Generally, fire extinguishers are to be located near the entrance(s) and/or exit(s) of the space and/or near concentrations of flammable materials.

The Vessel shall be fully outfitted with portable fire extinguishers as required by Authoritative Agencies. In addition, the Contractor shall provide two (2) spare portable fire extinguishers, of each type and size, as those provided to meet Authoritative Agency requirements. Spare portable fire extinguishers shall be turned over to the WSF Representative prior to Dock Trials.

13.7.2 Fire Axes

Fire axes and all necessary mounting brackets shall be provided and located throughout the Vessel in accordance with 46 CFR §76. For WSF Fleet-wide Standardization purposes, fire axes shall be INDIAN CHIEF BRAND, of MANN EDGE TOOL Co., Lewiston, PA and be of a USCG approved type, and shall be mounted within the fire station enclosures on the Passenger Deck areas. Fire Axes on the Lower and Upper Vehicle Deck and Sun Deck areas shall be enclosed in surface mounted "RED" metal cabinets with scored clear plastic door and key. All stowage shall be designed and installed to withstand both physical and temperature shock and service environment conditions as set forth in Section 1 of the Technical Specification. Fire axes in Emergency Squad Lockers do not require metal cabinets with scored plastic door, but do require bulkhead mounting brackets.

The Vessel shall be fully outfitted with portable fire axes as required by Authoritative Agencies.

13.7.3 Emergency Squad Lockers

Two (2) Emergency Squad Lockers shall be provided on the Vessel: one (1) locker on the Lower Vehicle Deck, End No. 1 just off the Anchor Winch area and one (1) on the Passenger Deck, End No. 2 just aft of the Purser's Office.

Provide equipment for **each** Emergency Squad Locker as set forth in the *Emergency Squad Lockers* Subsection in Section 16 of the Technical Specification and in accordance with **TABLE 13-3** below:

TABLE 13-3
Emergency Squad Locker Equipment
(each squad locker)

Description	Quantity
Self-contained Breathing Apparatus (SCBA)	Two (2)
ZICO Walkaway® Bracket for SCBA	Six (6)
Spare SCBA Air Bottles (fully charged)	Four (4)
Spare face pieces for the SCBAs, sizes S, M and L	Two (2) each size
Flame Safety Lamp	One (1)
Fire Axe (INDIAN CHIEF BRAND)	One (1)
CO_2 Extinguisher, 15 pound	One (1)
Dry Chemical Extinguisher, 15 pound	One (1)
Flashlight, three (3) cell, explosion proof	Two (2)
Spare Flashlight Batteries	Six (6)
Lifeline, 50 foot	Two (2)
Fireman's Bunker Pants (GLOBE, or equal, with NFPA approval)	Eight (8)
Fireman's Bunker Coats (GLOBE, or equal, with NFPA approval)	Eight (8)

TABLE 13-3, cont'd
Emergency Squad Locker Equipment
(each squad locker)

Description	Quantity
Helmet (with NFPA approval)	Four (4)
Helmet Flash Hood	Four (4)
Boots, pair (with NFPA approval)	Eight (8)
Suspenders	Four (4)
Gloves, rubber (with NFPA approval)	Eight (8)
Gloves, leather	Eight (8)

Note: NFPA is the National Fire Protection Association

For WSF Fleet-wide Standardization purposes, all SCBA's shall be SCOTT AIR PACK Model 2.2, positive pressure unit, self-contained portable breathing apparatus integrated with the Scott Pak-Alert™ SE + Distress System. Helmet and suspenders shall be adjustable so that one size fits all. Boots, gloves and bunker pants and coats shall be provided for **each** Emergency Squad Locker in the quantities and of the sizes in **TABLE 13-4** below. Distribute eight (8) different size bunker gear (fireman's suits) to each squad locker. WSF will adjust location of the various firemen's suits as appropriate during crew training. Provide, as a minimum, eight (8) coat hooks for hanging complete sets of bunker gear. Provide wall mounting brackets for the fire extinguisher and fire axe. Mount two (2) SCBA ZICO Walkaway® Brackets at fifty-four (54) inches above finished deck for SCBA storage, the remaining four (4) brackets convenient for storage of spare air bottles.

TABLE 13-4
Fireman's Suit Sizes
(each squad locker)

Item	Size	Quantity
Bunker Pants (Waist size)	30	1
	32	1
	34	1
	36	1
	38	1
	40	1
	44	1
	50	1
Bunker Coats (Coat size)	36	1
	38	1
	40	1
	42	1
	44	1
	46	1
	48	1
	52	1
Boots	7	1
	8	1
	9	1
	10	1
	11	1
	12	1
	13	1
	14	1
Gloves	Small	2
	Medium	2
	Large	2
	Extra Large	2

Emergency Squad Equipment Lockers shall be provisioned in accordance with this Section of the Technical Specification, Authoritative Agency requirements, and comply with the requirements of 46 CFR §76 and 46 CFR §77.

In addition to the Emergency Squad Locker equipment requirements above, provide one (1) bunker gear stowage area in the starboard Crew Locker Room/Stores area. The bunker gear stowage area shall be provided with all the equipment as set forth in **TABLE 13-3** and **TABLE 13-4**. Provide and install shelves, brackets, hooks, and storage to protect the equipment from physical shock, temperature shock, and service environment conditions as set forth in this Section, Section 1 and Section 18 of the Technical Specification.

The Vessel shall be fully outfitted with **all** other fire fighting equipment as required by regulation and Authoritative Agencies.

13.8 SPARE PARTS AND INSTRUCTION MANUALS

Design and provide a list of recommended spare parts and special tools for those items which are Contractor furnished, together with parts lists and instruction manuals necessary to maintain and service provided equipment and accessories in accordance with the requirements of Sections 86 and 100 of the Technical Specification.

13.9 TESTS, TRIALS AND INSPECTIONS

Tests and/or trials shall be in accordance with this Section and Section 101 of the Technical Specification.

Inspections shall be performed as defined in this Section and Section 1 of the Technical Specification.

13.10 PHASE II TECHNICAL PROPOSAL REQUIREMENTS

The deliverables required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase II Technical Proposal stage of Work in accordance with the requirements of Section 100 of the Technical Specification.

See Section 100 for additional requirements regarding technical documentation.

13.11 PHASE III DETAIL DESIGN AND CONSTRUCTION REQUIREMENTS

The following deliverables, in addition to others required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase III Detail Design stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

A. Fire Extinguisher List

B. Emergency Equipment List

C. Fire Patrol Route and Key Stations

The ***Fire Extinguisher List*** shall identify the types, sizes and locations of fire extinguishers throughout the Vessel.

The ***Emergency Equipment List*** shall include all Emergency Squad Lockers equipment (by individual locker) and emergency equipment positioned in other locations throughout the Vessel. The list shall identify the equipment manufacturer and model number.

See Section 100 of the Technical Specification for additional requirements regarding technical documentation.

(END OF SECTION)